

# NUCLEONICA:

## A Platform for Knowledge Management at ITU?



## What is Knowledge Management (KM)?

“The idea of a KM system is to enable employees to have ready access to the organization's based documented of facts, sources of information, and solutions...”

“Knowledge Management comprises a range of practices used by organisations to identify, create, represent, and distribute knowledge”

...

## Knowledge Management at ITU:

## What can we learn from Nucleonica?



... web driven nuclear science

Sunday, November 18, 2007

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### Nucleonica - web driven nuclear science



NUCLEONICA is a new nuclear science web portal from the European Commission's Joint Research Centre. The portal provides a customisable, integrated environment and collaboration platform for the nuclear sciences using the latest internet "Web 2.0" dynamic technology.

NUCLEONICA is aimed at professionals, academics and students working with radionuclides in fields as diverse as the life sciences (e.g. biology, medicine, agriculture), the earth sciences (geology, meteorology, environmental science) and the more traditional disciplines such as nuclear power, health physics and radiation protection, nuclear and radiochemistry, and astrophysics. It is also used as a knowledge management tool to preserve nuclear knowledge built up over many decades by creating modern web-based versions of so-called legacy computer codes.

NUCLEONICA provides "software as a service" on the web rather than through installed software, adding a greater level of stability and security and avoiding version compatibility and update problems. In addition, all NUCLEONICA's web applications are browser and operating system independent and can therefore be accessed by most web browsers.

NUCLEONICA offers the following main features:

- » **Data Centre:** Online interactive nuclide charts. Reference data and searchable databases for internationally evaluated nuclear data. Library creation software.

#### NUCLEONICA HOT TOPICS

» **Open Call for JRC Traineeships**  
November 14, 2007

ITU's first open call for JRC-Traineeships has been published on our website. The deadline for applications is 6 December 2007 (midnight). In particular we have a position for assistance in the development of an electronic version of the Karlsruhe

 **JRC**  
EUROPEAN COMMISSION

  
Institute for  
Transuranium  
Elements

#### NUCLEAR NEWS

**French FM: France is not ruling out a military strike on Iran**  
NOV 18 Even though in Tehran the IAEA's report was described as a "political victory" that may prevent the intensifying of international sanctions, Kouchner says that "for now Iran persists in not meeting it [...]"

**Iran: UNSC interference illegal**  
NOV 18 Mohammad Saeedi, a senior Iranian nuclear official has said insistence on pursuing Iran's nuclear program at the Security Council lacks legal grounds, PressTV reported. [...]

**Iran says ready to act if attacked ...**  
NOV 18 LONDON, November 18 (IranMania) - Hardline Iranian President Mahmoud Ahmadinejad said Iran was ready to respond if attacked, but played down the prospect of war with the United States, Reuters report [...]

**'Safe' uranium that left a town contaminated**  
NOV 18 It is 50 years since Tony Ciarfello and his friends used the yard of a depleted uranium weapons factory as their playground in Colonie, a suburb of Albany in upstate New York state. "There wasn't no f [...]"

**Chavez dealing pain to Spain**  
NOV 18 Chavez, who has nationalised large parts of the economy this year under his self-styled socialist "revolution", said last week he will revise diplomatic and business ties with the

# Nuclear Science Data & Applications

# Nucleonica Wiki (CMS)

# Networking with Nucleonica

# Training Courses

[illegible]

### Reductive Decay Chains

It is often the case that the decay product of a nuclear decay is itself radioactive. In such cases one speaks of radioactive decay "chains". As an example, consider the decay of  $^{238}\text{U}$  to  $^{234}\text{Th}$  via  $\alpha$  - emission. The daughter  $^{234}\text{Th}$  is itself radioactive and decays to  $^{234}\text{Pa}$ . Here generally such nuclei are said to be in a "radioactive chain".

Q: Can "leak" occur - i.e. might the daughter  $^{234}\text{Th}$  be stable? In addition, there may be internal nuclear transitions from the daughter to the parent.

the daughter for radioactive isotopes decay in a more complicated way. In the general picture of radioactive decay one has two emergent symmetries by Bateman (Proc. Camb. Phil. Soc. 1910) & Kac (Ann. Math. Phys. 1974).

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 1: Successive radioactive decay with branching and inverse terms.

Figure 2

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 3

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 4

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 5

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 6

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 7

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 8

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

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Figure 8

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Figure 9

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

Figure 10

$$\begin{array}{c} \text{Q} \\ \downarrow \\ \text{Q}_1 \\ \downarrow \\ \text{Q}_2 \\ \vdots \\ \text{Q}_n \end{array}$$

At Bateman's solution of a system of ordinary equations in 1910

the solution of a system of ordinary equations in 1910

the solution of a system of ordinary equations in 1910

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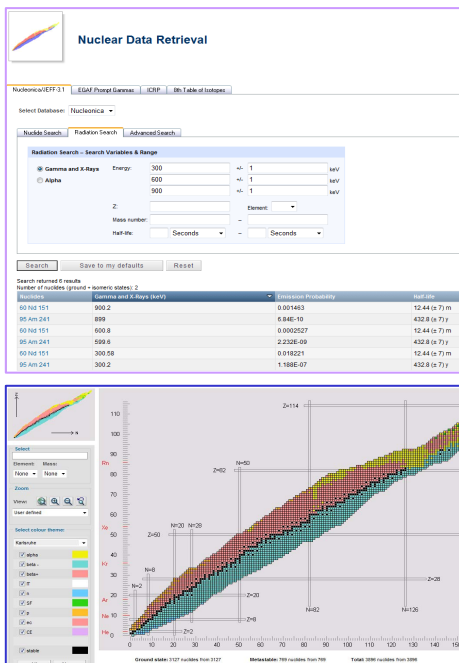
the solution of a system of ordinary equations in 1910

the solution of a system of ordinary equations in 1910

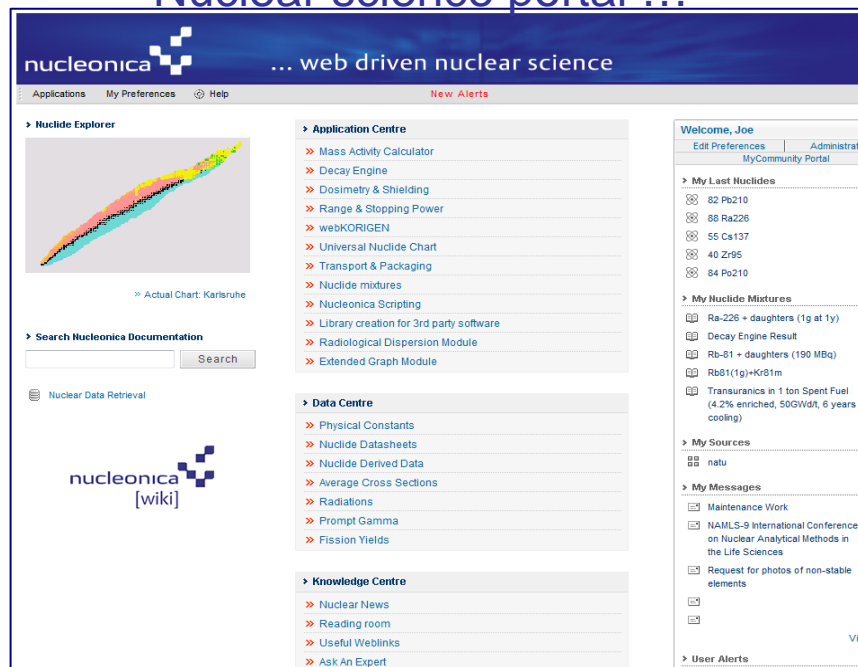
the solution of a system of ordinary equations in 1910

[illegible][illegible]

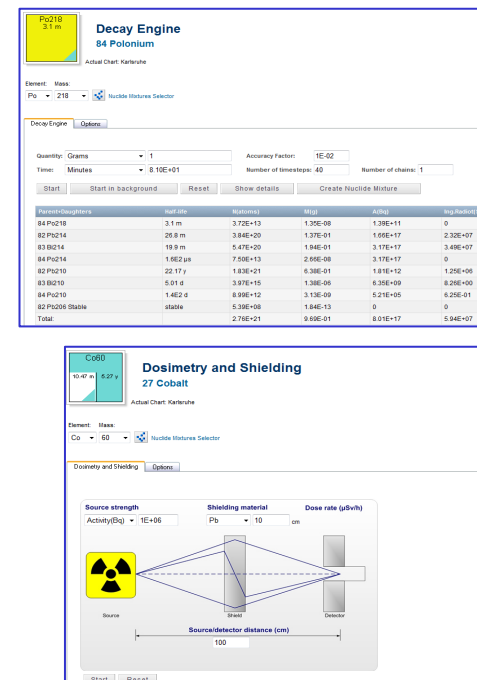
## Data centre...



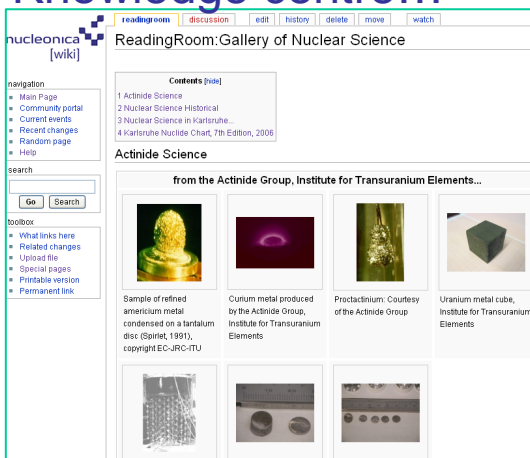
## Nuclear science portal ...



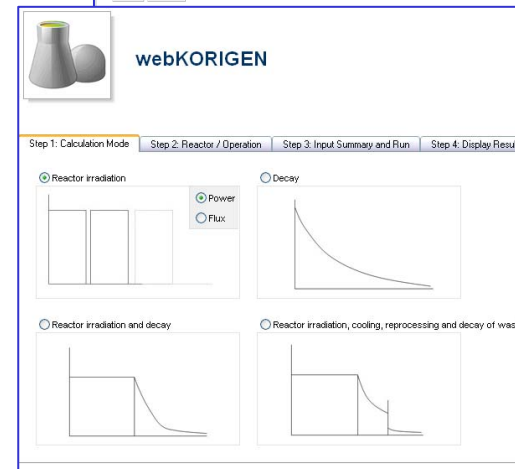
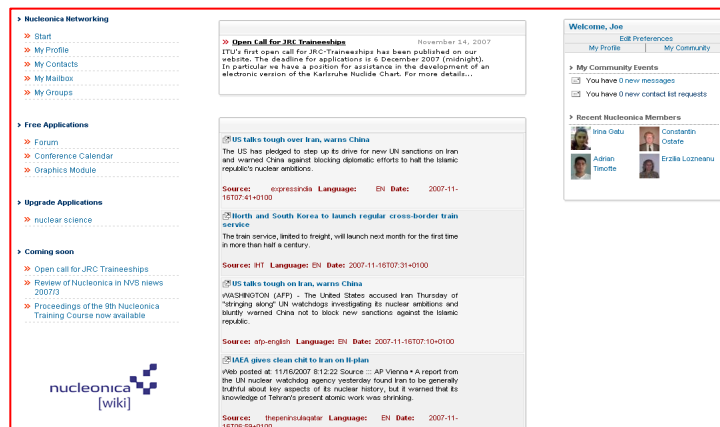
## Applications centre...



## Knowledge centre...



## Networking centre...



## October 2007 Karlsruhe

[edit]

### 9th Nuclear Science Training Course with Nucleonica, 25/26th Oct. 2007, Ostendorfhaus, Karlsruhe

The 9th Nuclear Science training course on Radioactivity, Radionuclides and Radiation with Nucleonica was held at the Ostendorfhaus, Karlsruhe from the 25th to 26th October, 2007. The two-day course provided a general introduction to the recently released Nucleonica: the new science networking and applications portal. Nucleonica is a powerful and versatile web-based software package for the nuclear science community. With examples and exercises, a variety of core and topical issues in nuclear science and technology were presented by experts in their respective fields.

A total of twenty-nine participants, around half of them women, with a diverse range of backgrounds attended the course. There were participants from Azerbaijan, Belgium, Bulgaria, Czech Republic, Poland, Romania and Turkey. In addition there were 10 participants from the Institute for Transuranium Elements. Among them were students, academics and industry professionals from fields such as nuclear medicine, radiation protection, environmental radioactivity and reactor physics.

[Final Agenda 25th Oct. 2007](#)

[How to get from the hotel to the conference training centre](#)

[Links to the presentations and exercises:](#)

[Networking with Nucleonica \(J. Magill\) Exercises](#)

[Nuclear Data \(J. Galy\) Exercises](#)

[Nuclide Charts \(C. Normand\) Exercises](#)

[Decay Engine \(A. Berlizov\) Exercises](#)

[Dosimetry & Shielding \(J. Galy\) Exercises](#)

[Nuclear Forensics & Illicit Trafficking \(K. Mayer\) Exercises](#)

[Overview of the Institute for Transuranium Elements \(F. Wastin\)](#)

[Advanced Nucleonica Features \(J. Magill\)](#)

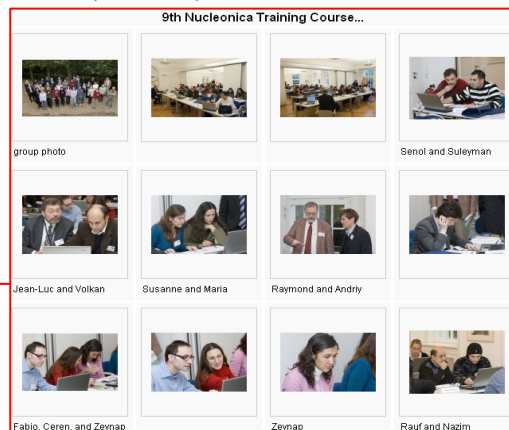
[Training Course Feedback](#)

[QM Questionnaire](#)

[Course Certificate](#)

[List of Participants](#)


[Gallery](#)



Group Photo Oct. 2007, Ostendorfhaus Karlsruhe




Contract signed with FZK, IKET on the development and implementation of a web-based version of KORIGEN for fuel cycle calculations...



... web driven nuclear science

Applications My Preferences Print Help



## webKORIGEN


Step 1: Calculation Mode
Step 2: Reactor / Operation
Step 3: Input Summary and Run
Step 4: Display Result

Reactor irradiation

Reactor irradiation and decay

Decay

Reactor irradiation, cooling, reprocessing and decay



## webKORIGEN

Step 1: Calculation Mode
Step 2: Reactor / Operation
Step 3: Input Summary and Run
Step 4: Display Result

Display Results at 6 y for most important nuclides

Display quantity: Activity (Bq)

Top Nuclides	Results
Cs137	1.095E+17
Ba137m	1.036E+17
Pu241	9.937E+16
Y90	7.129E+16
Sr90	7.127E+16
Cs134	3.065E+16
Pm147	2.917E+16
Eu154	9.611E+15
Rh106	9.449E+15
Ru106	9.449E+15
Kr85	7.199E+15
Cm244	6.205E+15
Pu238	5.291E+15
Ce144	3.983E+15
Pr144	3.983E+15
Sb125	3.669E+15
Eu155	2.477E+15
Am241	1.259E+15
Te125m	8.950E+14
Pu240	4.933E+14

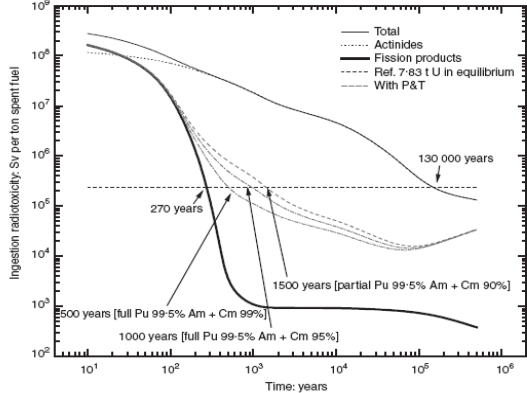
Top Elements	Results
Cesium	1.401E+17
Plutonium	1.054E+17
Barium	1.036E+17
Yttrium	7.129E+16
Strontium	7.127E+16
Promethium	2.917E+16
Europium	1.209E+16
Ruthenium	9.449E+15
Rhodium	9.449E+15
Krypton	7.199E+15
Curium	6.249E+15
Praseodymium	4.031E+15
Cerium	3.983E+15
Antimony	3.670E+15
Americium	1.313E+15
Tellurium	8.950E+14
Neptunium	4.048E+13

Totals	Results
Actinides:	1.130E+17
Fission Prod.	4.670E+17
Total	5.800E+17

**Neutron and gamma rates**

Neutron rate: 2.491E+10 n/s

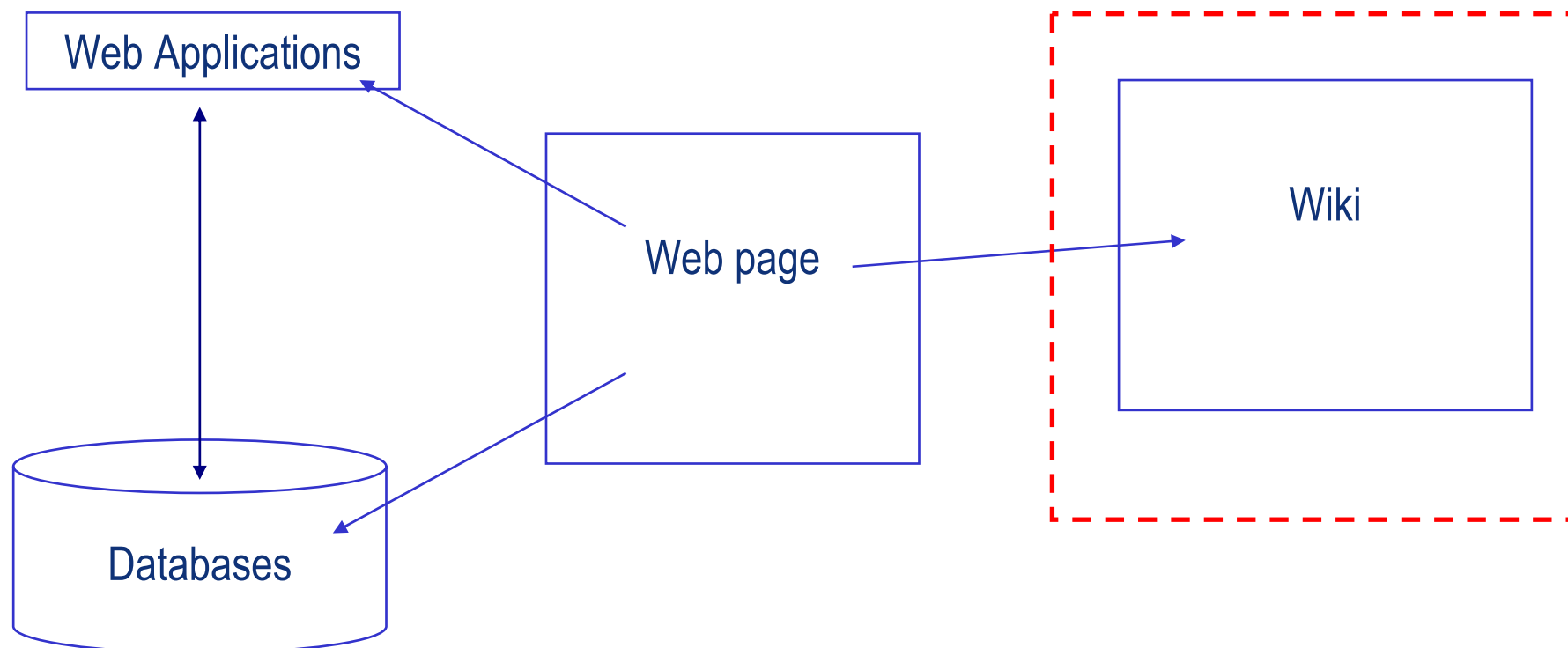
Gamma rate from Actinides: 6.427E+13 MeV/s



# NUCLEONICA: Logical Structure



## Knowledge Management at ITU: What can we learn from Nucleonica?



**The NUCLEONICA Structure**

## First step in the creation of an ITU SKM system

Use the NucleonicaWiki to test the idea...

A wiki is software that allows users to create, edit, and link web pages easily. Wikis are often used to create collaborative websites and to power community websites (e.g. Nucleonica). They are being installed to provide affordable and effective Intranets and for Knowledge Management.

The wiki has been described as "the simplest online database that could possibly work". One of the best known wikis is Wikipedia.

MediaWiki was custom-designed for the high-volume Wikipedia encyclopedia project; it is also used for all other projects run by the Wikimedia Foundation, which operates Wikipedia. It is written in PHP and uses a MySQL database backend; it is publicly available and suitable for tailoring to other applications.

### Wiki

Platform: MediaWiki

Scripting language: PHP

Database: MySQL

Web Server: Apache, IIS

### Requirements:

1. Computer + Wiki software (free)
2. Technical support (Helpdesk?)
3. Wiki coordinator

Use the NucleonicaWiki to test the idea...

adminonly

discussion

edit

history

delete

move

watch

nucleonica

[wiki]

navigation

Main Page

Community portal

Current events

Recent changes

Random page

Help

search

Go Search

toolbox

What links here

Related changes

Upload file

Special pages

Printable version

Permanent link

AdminOnly:Scientific Knowledge Management @ ITU

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2.1.2 How do I submit a document to PUBSY?

2.2 ITU Publications - Quick Links

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2.2.2 Articles & Conference Papers

2.2.3 Technical Notes

2.2.4 Special Publications

2.2.5 PR Brochures

2.2.6 Patents (2003-2004)

2.3 Creation of Scientific Documents @ITU

3 Scientific Resources and Services @ITU

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3.2 NUCLEONICA

3.3 Karlsruhe Nuclide Chart

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3.5 Access to Network Drives

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3.6.1 DSolutions

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5 Scientific Information Resources - Public Web Applications

5.1 JRC Project Knowledge System (PKS)

5.2 JRC SAP PS

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5.5 Nuclear Science References

5.6 Google Scholar

5.7 Intute

5.8 Patents

5.9 Translations and Drafting Aides

Knowledge Management Introduction

Knowledge Management

ScienceDirect

ScienceDirect is the largest collection of scientific and bibliographic information. Through this platform, the full-text of the articles published in 1,813 journals is accessible for all journals. ScienceDirect contains science, technology, and bibliographic information. Reference Works, Books, ScienceDirect offers 2,400 titles. In addition, the ability to search million articles directly. Volume 1, Issue 1, million articles prior to after 1994.

Scopus

Scopus is the largest database of research sources. It's designed for scientists need. Quality Scopus provides superior research process. Produced by Elsevier abstract and citation and quality web sources. information today's provides an accurate journals (among the and 535 Open Access conference proceedings includes currently 2 million of references individual registration alerts to stay up-to-date their search query.


Publications Management System PUBSY

The JRC **PUBSYS** portal is the corporate publications management system of the JRC. As such, PUBSYS is also the publications management system used at ITU. It consists of the following features:

- Access to the digital repository of JRC scientific publications and reports
- The internal workflow system for publications registration
- Up-to-date information about the JRC Publications policy

It is managed by the PUBSY Corporate Publications Office in Ispra (JRC-PUBSY@ec.europa.eu).

In the example below, the PUBSY search interface has been used to find all publications from ITU in 2007. The results are shown to the right. There are in total 256 registered publications in the PUBSY database for ITU in 2007. Clicking on any individual result leads to an abstract window with a link to the full text of the document (pdf).



## JRC PUBSYS

JRC PUBSYS

Search JRC PUBSYS

Search JRC PUBSYS's Repository for Registered Publications

Please find keywords in the search box or in several search filters.  
All publications matching the selected criteria will be displayed.  
New help can be found by clicking on the help icon below the field.

Search by

keywords (0-8)

Full Text Search ☐ Exact string search ☐ Highlight keywords ☐

Author(s) (to select)

Institution

Category


Journal

Limit to include

year

Authors

Publication Year



## JRC PUBSYS

JRC PUBSYS

Search Criteria

year: All (1 year ago)

New Search  Exact Export  Print Current Page  Print All Pages  Help Page  Next >>

Search Criteria

Full Text Search ☐ Exact string search ☐ Highlight keywords ☐

Author(s) (to select)

Institution

Category

Journal

Limit to include

year

Authors

Publication Year

## ScienceDirect

ScienceDirect® is the world's largest electronic collection of science, technology and medical full-text and bibliographic information, maintained by Elsevier. Through this platform, all JRC users have access to the full-text of the articles published in the last 7 years in 1,813 journals; abstracts can be freely accessed for all journals by all users.

ScienceDirect contains over 25% of the world's science, technology and medicine full text and bibliographic information. Apart from online eBooks, Reference Works, Handbooks and Book Series ScienceDirect offers a rich journal collection of over 2,400 titles. In addition, the Backfiles program offers the ability to search a historical archive of over 6.75 million articles directly from your desktop, back to Volume 1, Issue 1. The collections contain four million articles prior to 1995, and 2.75 million articles from after 1994.

ScienceDirect

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Quick Search Title, Abstract, Keywords Author Page 1 of 1 with 2952 hits

Search Tips Journal Article Volume Issue Page Clear Go

Browse Journal Books Digitally Only Journal Articles by Subject Favorite Journals

Include  
☒ Full text available  
☐ News-subscribed  
☐ What does this mean?

Exclude  
☐ Journals and Book Series  
☐ All Books  
☐ Reference Works only

Apply

2952 Hits Found

Journal Book Title  
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z


Content Type	Article Fnd	Full Text Alerts
A		
<input type="checkbox"/> Academic Radiology		<input checked="" type="checkbox"/> Apply
<input type="checkbox"/> ACC Current Journal Review	Journal	<input type="checkbox"/>
<input type="checkbox"/> Accident Analysis & Prevention	Journal	<input type="checkbox"/>
<input type="checkbox"/> Accident and Emergency Nursing	Journal	<input type="checkbox"/>
<input type="checkbox"/> Accounting Forum	Journal	<input type="checkbox"/>
<input type="checkbox"/> Accounting, Management and Information Technologies	Journal	<input type="checkbox"/>
<input type="checkbox"/> Accounting, Organizations and Society	Journal	<input type="checkbox"/>
<input type="checkbox"/> ACOD Clinical Review	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Anaesthesiologica	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Anatomica Sinica	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Biomaterialia	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Ecologica Sinica	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Genetica Sinica	Journal	<input type="checkbox"/>
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<input type="checkbox"/> Acta Materialia	Journal	<input type="checkbox"/>
<input type="checkbox"/> Acta Mathematica Scientia	Journal	<input type="checkbox"/>

Science Direct search mask




## Scopus

Scopus is the largest abstract and citation database of research literature and quality web sources. It's designed to find the information scientists need. Quick, easy and comprehensive, Scopus provides superior support of the literature research process. Updated daily, Scopus offers:

Produced by Elsevier, SCOPUS is the largest abstract and citation database of research literature and quality web sources, designed to find the information today's researchers need. SCOPUS provides an accurate indexation of about 15,000 journals (among them, over 12,650 academic journals and 535 Open Access journals), and more than 700 conference proceedings are covered. SCOPUS includes currently 28 million of abstracts and 245 million of references added to all abstracts. Upon individual registration, users can easily create e-mail alerts to stay up-to-date on new articles matching their search query.


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 Joist Research Centre - JRC@St Andrews

Basic Search

Author Search

Advanced Search

Search New

Search for:  in Article Title, Abstract, Keywords

Eq. "heart attack" and stress

AND  in Article Title, Abstract, Keywords

Limit to: Date Range (inclusive)

☒ Published
 ☐ All years
 ☐ to Present

☐ Added to Scopus in the last  days

Subject Areas ☐

☒ Life Sciences (> 3,400 titles)  
☒ Health Sciences (> 9,300 titles)  
 Includes 100% Medline coverage

☒ Physical Sciences (> 6,800 titles)  
☒ Social Sciences (> 2,800 titles)

Scopus search mask

so be exported to Excel for further  
earlier publications, see ITU Publications

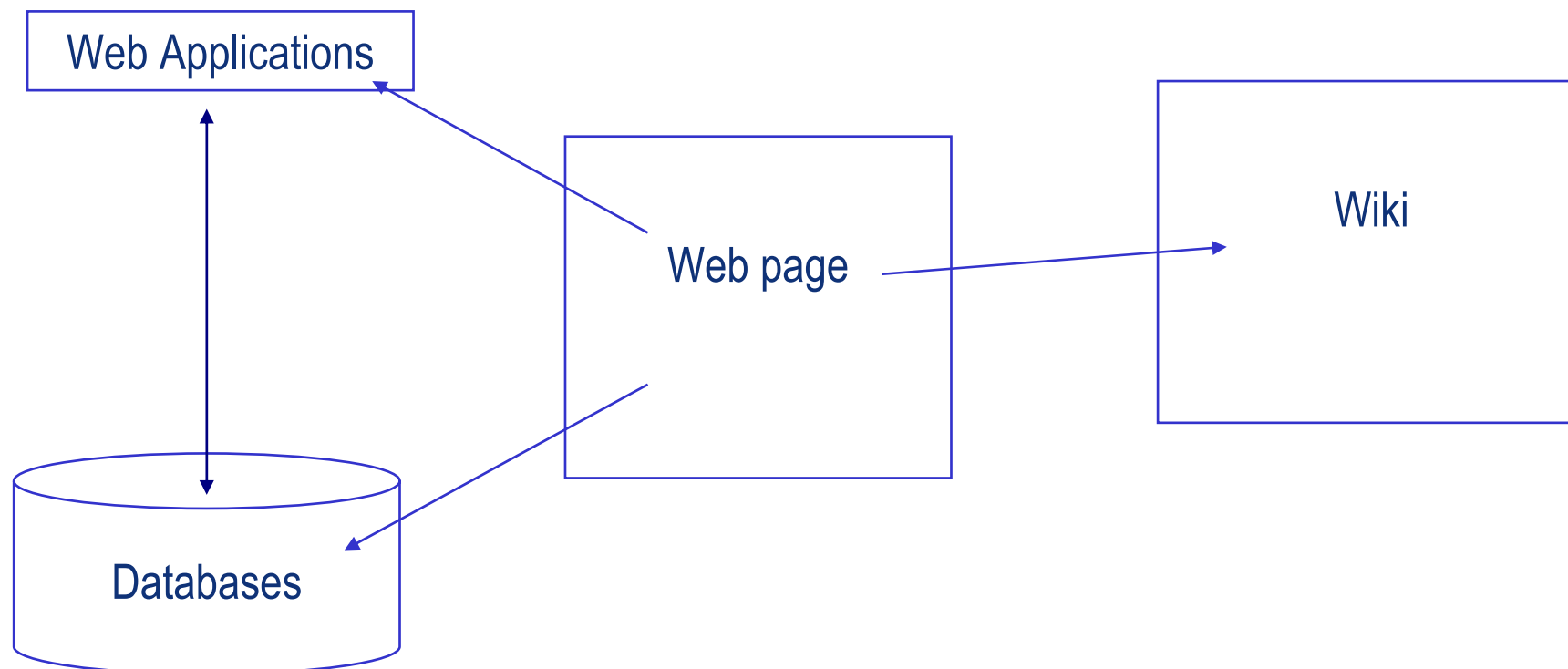
Proposal:

# SciencePipes

A Platform for Knowledge Management,  
Education and Training based on  
Modular Web Services

nucleonica 

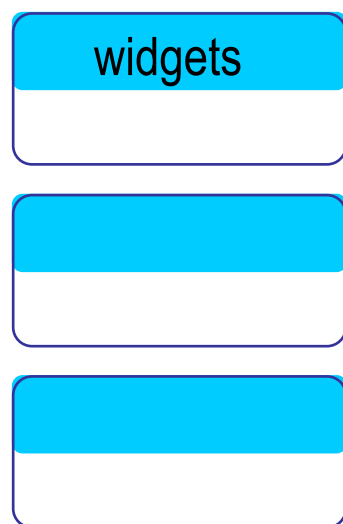
## Knowledge Management at ITU: What can we learn from Nucleonica?



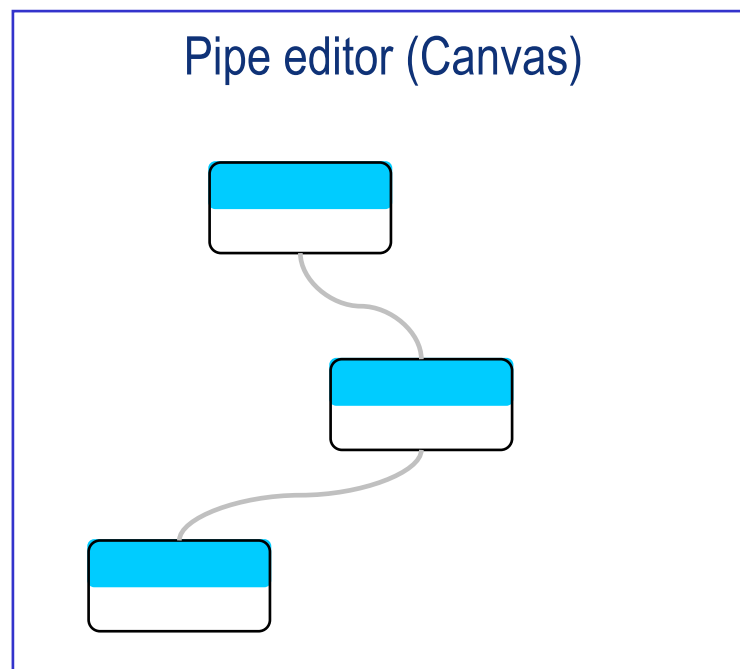
**The NUCLEONICA Structure**

# sciencePipes

**A New Approach to Knowledge Management, Education and Training  
based on Modular Web Services**

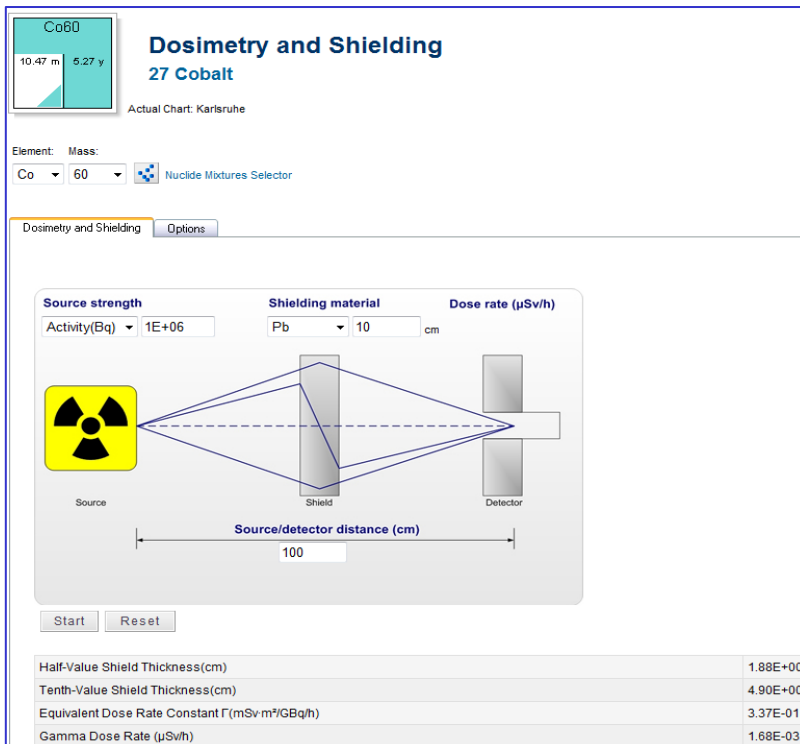


...



## What is a “web service”?

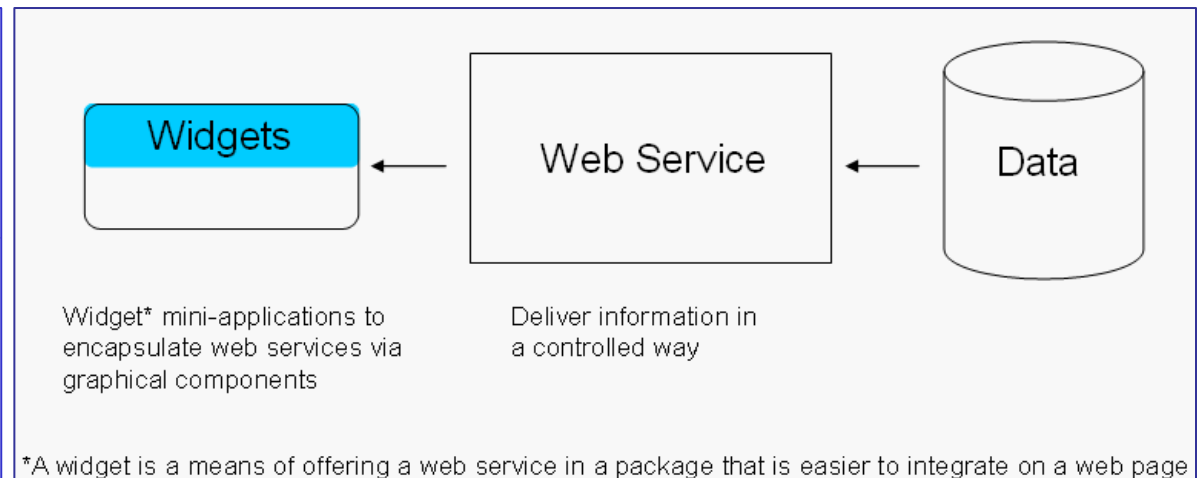
### Web application (Nucleonica)



The screenshot shows the 'Dosimetry and Shielding' interface for Cobalt-60. It includes input fields for 'Source strength' (Activity in Bq, set to 1E+06) and 'Shielding material' (Pb, 10 cm). A diagram illustrates the source, shield, and detector setup with a 'Source/detector distance (cm)' of 100. Below the diagram are 'Start' and 'Reset' buttons. At the bottom, a table displays calculated values:

Half-Value Shield Thickness(cm)	1.88E+00
Tenth-Value Shield Thickness(cm)	4.90E+00
Equivalent Dose Rate Constant $\Gamma$ (mSv·m <sup>2</sup> /GBq·h)	3.37E-01
Gamma Dose Rate (μSv/h)	1.68E-03

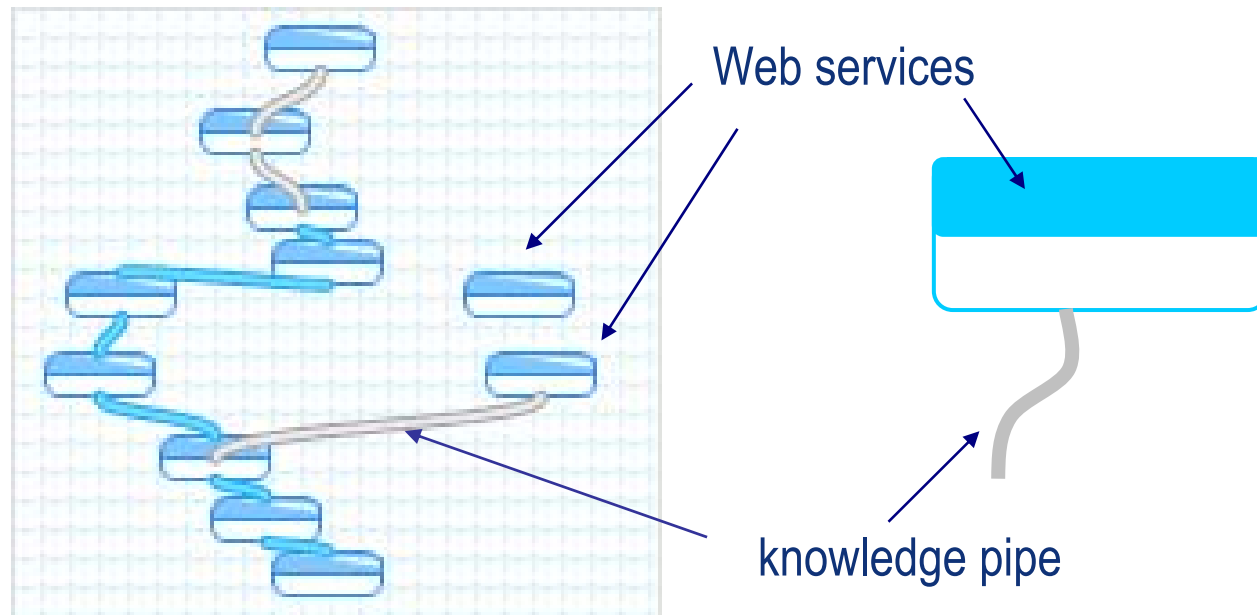
### Web service...



- cannot be combined from other web modules from any location (-)
- can only be called up from within Nucleonica (-)
- combining applications requires programming knowledge(-)
- can be combined from other web services from any location (+)
- can only be called up from anywhere anytime (+)
- combining web services requires no programming knowledge(+)

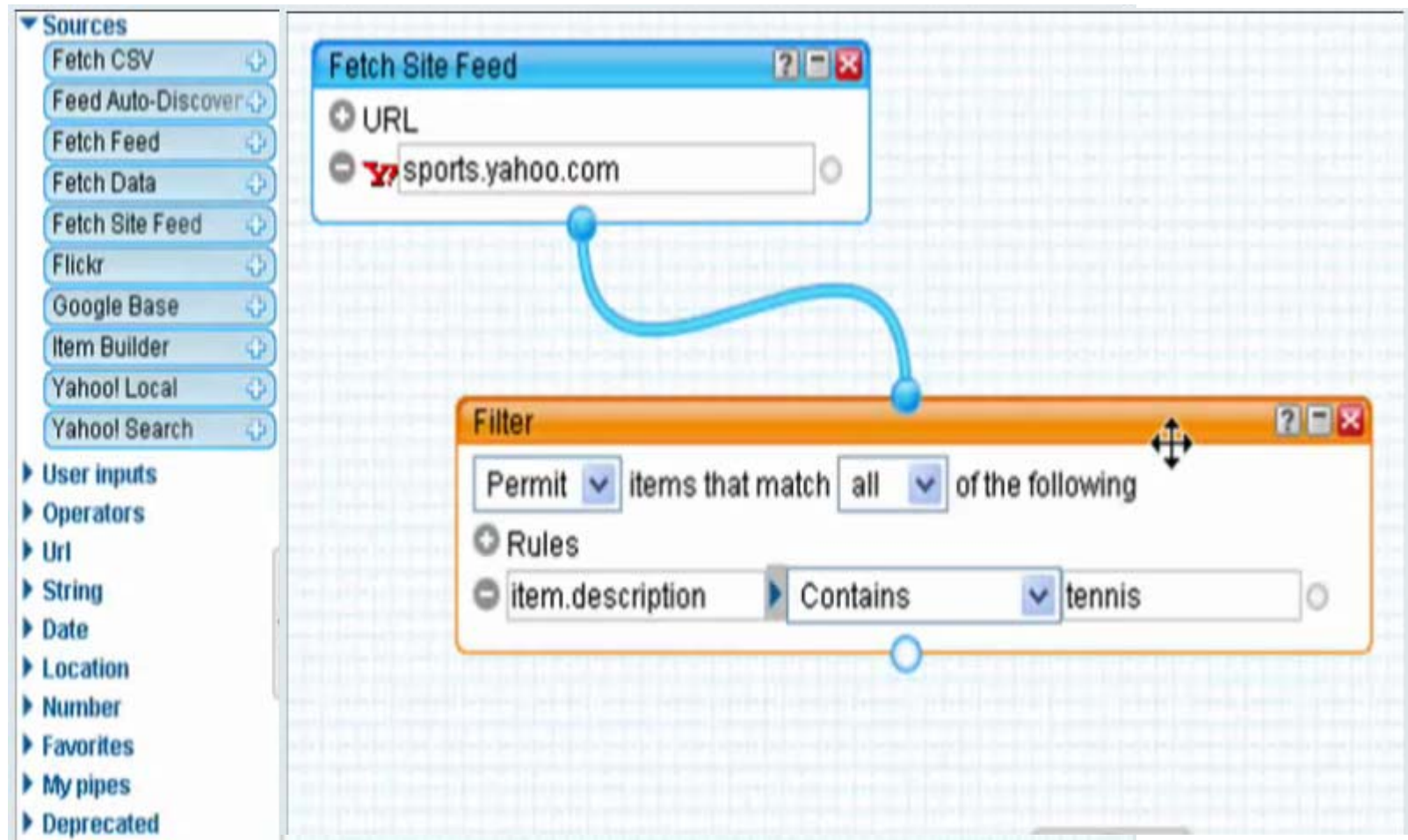
## What are “Pipes and Filters”?

A “pipe” service provides the user with a drag and drop editor for connecting internet data sources, processing them, and redirecting the output.



Schematic diagram for connecting web services through the use of pipes.

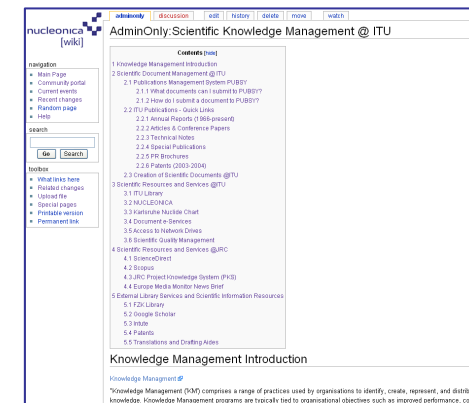
## The Pipe Editor...



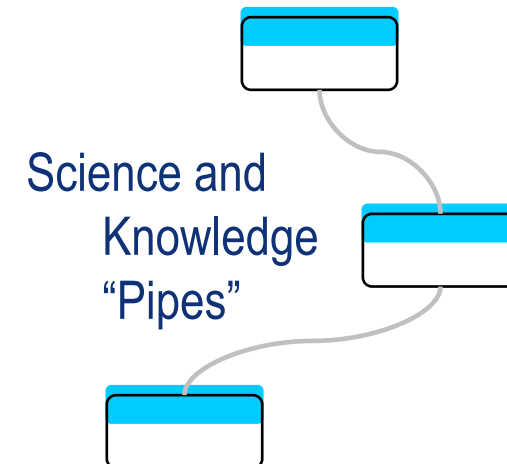
<http://www.jumpcut.com/fullscreen?id=594F555C568011DC9D24000423CEF5B0&type=movie>

## Conclusions: A Strategy for Scientific Knowledge Management at ITU

1. Short Term: The NUCLEONICA Wiki can be used for SKM@ITU providing full documentation of the applications and procedures available and direct links to the web applications. A first version is available



2. Medium Term: The NUCLEONICA Applications (containing various types of Knowledge) should be converted into modular Web Services. These will form the basic building blocks of a new flexible knowledge management platform. This platform will allow the combination of services from completely different web applications/services to be combined.



Thanks!



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